

THE IMPLEMENTATION OF THE RADEC LEARNING MODEL ON ENVIRONMENTAL LITERACY SKILLS OF ELEMENTARY SCHOOL STUDENTS

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ABSTRACT

Environmental literacy skills are students' abilities in involving various skills and knowledge to be able to understand, be responsible, and be able to provide a positive influence in efforts to solve problems related to environmental issues. Based on the results of TIMSS (Trend in International Mathematics And Science Study), AKMI, the environmental literacy skills of elementary school students in Indonesia are still in the low category. One of the learning models that can improve environmental literacy skills is the RADEC learning model (Read, Answer, Discuss, Explain, Create). This study aims to analyze whether there is an effect of environmental literacy skills after the RADEC learning model is applied. The method used in this study is a quasi-experimental study with a two control group posttest design. This study was conducted in class IV MIS Bina Insan Taqwa, Dramaga District, Bogor. The instruments used were test questions on students' environmental literacy skills and RADEC learning model implementation sheets. Based on the results of the study, the average value of students' environmental literacy skills in the experimental class posttest was 70.00. While the average posttest score for the control class was 36.82. Data processing was analyzed using SPSS 26 For Windows with Independent sample t-test at α (0.001) and sig 0.000 $< \alpha$ (0.001). The results of the study showed that there was a significant difference between the posttest of the experimental class and the control class. So it can be concluded that the increase in environmental literacy skills of MI students in grade IV of the Science subject after receiving treatment using the RADEC learning model.

Keywords: RADEC Learning Model, Environmental Literacy Skills.



INTRODUCTION

Education is closely related to the learning process. This is reinforced by Law No. 20 of 2003 regarding the national education system, which states that education is a conscious and planned effort to create a learning atmosphere or process that can actively help students develop their potential to possess religious spiritual skills, self-control, personality, intelligence, noble character, and other skills necessary for themselves, society, the nation, and the state. Developing students' potential and skills requires a good and effective learning process. Therefore, to realize effective and innovative learning, there needs to be a quality assurance effort in the learning process that meets the demands of 21st-century life. At least there are four 21st-century competencies that every student should possess, known as the 4Cs, which include creative thinking, critical thinking and problem-solving skills, communication, and collaboration. According to Sopandi (2019), these skills must be instilled in the learning process to ensure that students can be competitive and keep up with rapid developments in the era of globalization. This is in line with Pratama et al. (2020), which states that to adapt to life in the 21st century, ten skills are required for every student. These skills include communication, collaboration, creative thinking, metacognitive thinking, information literacy, critical thinking, information and communication technology literacy, career skills, citizenship, and skills related to individual and social responsibility.

Based on the above statement, one of the skills that can support students in facing the realities of the 21st century is literacy. According to the Ministry of Education and Culture (2016), literacy is the skill of accessing, understanding, and utilizing something intelligently through various activities, including viewing, reading, listening, writing, and speaking. Research shows that the literacy level in Indonesia is very concerning. The latest data from UNESCO in January 2020 ranked Indonesia second from the bottom in global literacy, where the public's reading interest is very low. The reading interest rate in Indonesia is only 0.001%. This means that out of 1,000 Indonesians, only 1 person is interested in reading. Another study titled "World's Most Literate Nations Ranked," conducted by Central Connecticut State University in March 2016, placed Indonesia at 60th out of 61 countries regarding reading interest, ranking above Botswana (61) and below Thailand (59). Even in terms of infrastructure to support reading interest, Indonesia ranks above European countries. However, out of 34 provinces in Indonesia, only 9 provinces fall into the moderate literacy category, while 24 provinces are categorized as low literacy, and one province falls into the very low literacy category and needs intervention (Kominfo.go.id, 2017). Environmental literacy is one type of literacy that needs to be improved as it is part of scientific literacy.

The context of learning, literacy, and the environment is very important to support the development of students' skills and cognitive knowledge, which can be acquired through diverse learning experiences tailored to the needs and abilities of the students. A person's ability to understand everything related to the natural environment, including identifying problems and providing solutions to address issues in the surrounding environment, is referred to as environmental literacy (Utami, F., 2019). Concern for the environment is one of the criteria for environmental literacy in Indonesia, which remains worrying. This is aligned with environmental issues in Indonesia, according to the

Coordinating Ministry for Human Development and Cultural Affairs (KEMENKO PMK) through the National Waste Management Information System (SIPSN) from the Ministry of Environment and Forestry (KLHK) in 2022. The data, gathered from 202 regencies/cities in Indonesia, indicates that the national waste pile reached 21.1 million tons. Of the total national waste production, 65.71% (13.9 million tons) is managed, while the remaining 34.29% (7.2 million tons) is not managed properly (Kemenkopmk.go.id, 2023). This illustrates that environmental problems in Indonesia are quite complex and varied. One factor that can determine the quality of a good environment is human behavior and activity. Irresponsible human behavior towards environmental sustainability can lead to environmental degradation (Nurrohmah, 2023). Based on this data, there is a need for awareness that must be possessed by every individual. Community awareness and involvement in addressing environmental issues need to be enhanced. This should be instilled early in students through the learning process. One way to achieve this is by improving environmental literacy skills, so that students become aware of environmental issues and, consequently, develop a sense of environmental stewardship.

In reality, environmental literacy among students in Indonesia has not been maximally implemented. This is evident from the low levels of environmental literacy, which is part of scientific literacy, as demonstrated by the results of the Trends in International Mathematics and Science Study (TIMSS), where Indonesia scored 397 out of an international score of 500, placing it among the bottom ten (Latif et al., 2022). This data is supported by the results of the AKMI (Indonesian Madrasah Competency Assessment), which indicates that students' literacy skills still require significant intervention, especially in environmental literacy as a component of scientific literacy.

The RADEC model is one of the options for teachers in developing environmental literacy skills. This learning model consists of several stages, as indicated by its name: Read, Answer, Discuss, Explain, and Create (Sopandi, 2021). The stages of the RADEC learning model do not require much time for implementation and do not necessitate extensive resources. Before the learning session, students are given questions aimed at understanding the concepts of the material. This process also provides motivation and involves student engagement. During the learning process, students are encouraged to develop their communication skills through the discussion stage, and they learn to explain the material again. By the end of the lesson, students should be able to realize the creative ideas they have acquired earlier.

METHODS

This research was conducted at a private Madrasah Ibtidaiyah school in the Bogor district, specifically located at Jl. Raya Petir, Gg Pasundan Rt 01/02, Desa Petir, Kecamatan Dramaga, Bogor, namely MIS Bina Insan Taqwa. The school has implemented the independent curriculum and has conducted AKMI/ANBK; however, issues remain regarding the low level of environmental literacy among students. This study is a quantitative research based on positivist philosophy, used to analyze a specific sample through data collection using research instruments. The method employed is a quasi-experimental design, utilizing a control class. The research design is a two control group posttest design, meaning there is a comparison between the treatment group and the

control group. The population consists of all fourth-grade students at MIS Bina Insan Taqwa, which includes class 4A as the experimental class (22 students) and class 4B as the control class (22 students). The sample was determined using probability sampling with random sampling to select the experimental and control classes. This study employed non-probability sampling to determine the sample size from both classes. Total sampling was used because the population is less than 100; thus, the entire population was included as the sample, totaling 44 students: 22 from class 4A as the experimental group and 22 from class 4B as the control group.

RESULTS

Literacy skills serve as a crucial foundation for students, enabling them to socialize using their language abilities, allowing them to ask questions and organize ideas to communicate with others. Education standards in the 21st century demand that students possess high literacy skills, numeracy, and self-confidence to navigate their lives as citizens. Environmental literacy is equally important as a skill to support 21st-century competencies. Environmental literacy provides students with a broad understanding of the environment, ways to act responsibly, care for it, and be aware of environmental issues. This can be supported through four indicators according to Septiyani (2021):

1. **Knowledge:** Understanding environmental issues in general through awareness of surrounding environmental problems.
2. **Skills (cognitive):** The ability of students to process and comprehend information about environmental issues.
3. **Attitudes:** A person's sensitivity to environmental issues, characterized by a mindset that is aware of these problems.
4. **Behavior or activity:** The presence of actions taken to address environmental problems.

The achievement of desired learning outcomes in environmental literacy skills must be supported by several factors, such as the learning model. The learning model serves as a guide for teachers in designing activities during the learning process; therefore, it significantly influences students' learning success. Indonesian education has introduced innovative models, such as the RADEC (Read, Answer, Discuss, Explain, and Create) learning model based on the implementation by Sopandi. This model provides an alternative for teachers that is suitable for conditions in Indonesia and represents a recent innovation in education aimed at developing competencies and modern literacy, as well as preparing for assessments conducted by educational institutions (Fuziani et al., 2021). This model requires students to engage in critical thinking, readiness, character development, and skills necessary for the 21st century. This literacy skill can be enhanced through the implementation of the RADEC learning model. In the class that applies the RADEC model, referred to as the experimental class, the average score is significantly higher compared to the control class (which did not receive the treatment). Based on descriptive statistical results, the average posttest scores for the experimental and control classes were 70.00 and 36.82, respectively. These results indicate that the average score of the experimental class is higher than that of the control class because they underwent the RADEC learning model treatment six times. It is clear that applying the RADEC learning model can improve students' environmental literacy skills.

The experimental class using the RADEC model was implemented over 6 meetings, including 2 sessions for each stage: Read, Answer, Discuss, Explain, and Create. During the

implementation of the RADEC model, several activities were conducted by the teacher. First, students were trained to read story problems related to the IPAS learning material. In the reading sessions, students were provided with reading materials to take home. Out of 22 students, only 20 read the material without parental assistance, and in the second session, only 15 students participated. As a result, the Read stage achieved a percentage of 82.5%. Challenges arose, as some students were unable to attend when the reading materials were distributed, and others who received the materials did not attend the subsequent sessions. The second stage is answering. At this stage, students are required to first read the reading materials that were provided earlier to answer the questions independently at home. They were given ample time and the opportunity to obtain additional information, and they could also be assisted by parents or other family members in answering the questions given. However, there were challenges, as many students were unable to attend the previous sessions, which led to confusion during the discussion and explanation processes in the following meeting. As a result, this stage only achieved a percentage of 82.5%.



Figure 1. Read and Answer stage

The next stage is discussion, students discuss the answers that have been done each at home then discussed at school in groups, students are required to cooperate with each other in solving existing problems, so that it can foster students' curiosity where students will start by reading, by reading students will obtain the intended information, students' reading interest can increase, then collaboration between members, and environmental literacy skills. The discussion took place with 6 groups, but only 3 groups began to be active in expressing their opinions, but were not yet optimal in processing the words that were poured out, because the characteristics of grade IV students who still need guidance and direction in expressing opinions with good word order, lack of self-confidence and more following the opinions of their friends so that they are not yet able to think independently and make appropriate decisions. The second meeting of the discussion stage, there were 5 groups that had begun to dare to explain and agree on the answers in each group, because students had begun to practice and develop their ability to express their opinions and their growing self-confidence. The percentage increased, so it was obtained as much as 67%.



Figure 2. Discuss stage

The next stage is explain, students must be able to explain the answers to the results of group discussions, so that teachers and other students can conclude more appropriate answers to the questions that have been given, but there are still some students who do not have a sense of confidence and minimal reading so that they have difficulty in explaining and responding to other groups, even some students who are not fluent in reading and that makes it difficult to apply the RADEC learning model. The average percentage of the explain stage was 70%.



Figure 3. Explain stage

The last stage is creativity in creating products related to the material. At the create stage, students must be able to create, creating here students create projects in the form of posters of energy conservation efforts and projects in the form of models and lanterns about energy transformation with an average percentage of 85%. Based on these stages, it is in line with the opinion of Setiawan et al. (2019) that developing communication skills, working together, and helping students gain conceptual understanding are the advantages of the RADEC learning model.



Figure 4. Create stage

Based on the hypothesis test, there is a difference in the average posttest of the environmental literacy skills of the experimental class and the control class, where the probability score $\text{sig } 0.000 < 0.01$ so that the environmental literacy skills differ significantly between the experimental class and the control class, it can be concluded that there is an increase in the literacy skills of students who are given the RADEC learning model treatment. The diagram of the average score of environmental literacy skills per indicator shows a difference in the average score between the experimental class and the control class, which can be seen in the following figure.

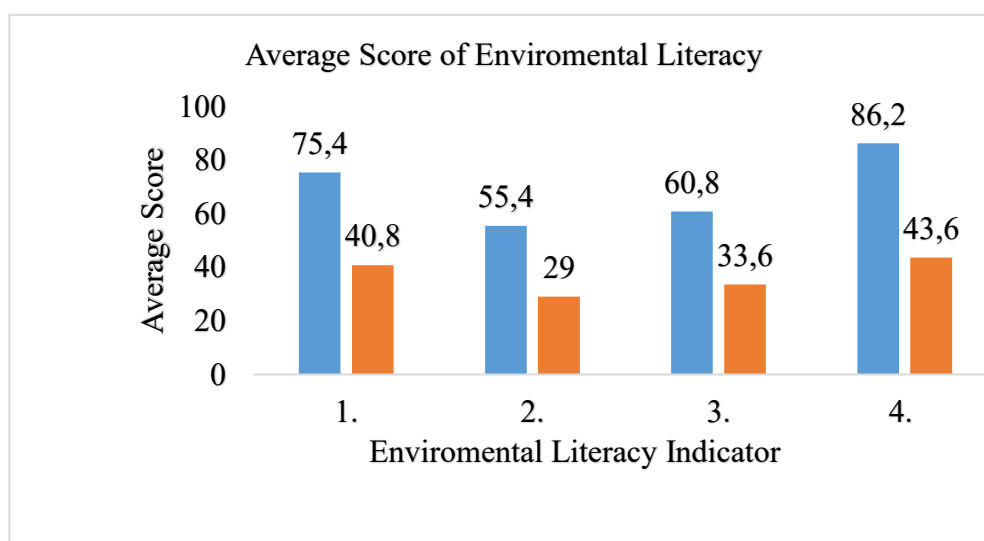


Figure 5. Average Score of Environmental Literacy Ability Per Indicator

Environmental literacy has 4 indicators including the first indicator regarding basic knowledge related to environmental issues, this knowledge can be obtained when teachers stimulate students to read existing problems with the read and answer stages in RADEC so that students' knowledge can increase. The second and fourth indicators are about attitudes and behaviors towards the environment. To form attitudes and behaviors that care about the environment, it can be done through the discussion stage and explaining in RADEC, students can share information, experiences, and perspectives on environmental issues. This process can foster awareness and concern for the environment, as well as develop a deeper understanding of the impacts and causes of environmental problems that are currently occurring in the surrounding environment. The third indicator is about cognitive skills so that it is in accordance with the create stage in RADEC because

cognitive skills and creative learning are closely related, with the existence of creative learning it can help students hone their thinking skills to generate new ideas that are expected to have a positive impact on the lives of students in the future. It is concluded that by implementing the RADEC learning model, it can improve the environmental literacy skills of students in Madrasah Ibtidaiyah.

CONCLUSION

The level of environmental literacy skills of fourth grade students at MIS Bina Insan Taqwa between the experimental class that implemented the RADEC learning model with an average Posttest score of 70.00 while the control class that did not implement the RADEC learning model obtained an average posttest score of 36.82. The difference obtained can be stated that the experiment that has been carried out using the RADEC learning model in learning activities can improve students' environmental literacy skills. Based on the results of observations of the implementation of the RADEC learning model with an average percentage of the implementation of the stages of the RADEC model in the fourth grade science subjects, namely 77.4% with a good category. At the Read and answer stages, an average of 82.5% was obtained, the discuss stage obtained 67%, the explain stage obtained 70%, the create stage obtained 85%. The average percentage shows that there were obstacles during the study that made the score less than optimal. The probability score (2-tailed) is $0.000 < 0.01$ so that H_0 is rejected, which means that H_1 is accepted, namely that the average environmental literacy ability of students is significantly different in the posttest scores of the experimental class and the posttest of the control class. Based on these calculations, it can be concluded that there is an increase in the environmental literacy ability of students by being treated with the RADEC learning model in the fourth grade science subjects at MIS Bina Insan Taqwa. Thus, the application of the RADEC model is very helpful in improving the environmental literacy abilities of students.

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